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Objective evaluation of school programs is a process in which a school staff collects information used to provide feedback as to whether or not a given set of objectives has been met. The Evaluative Programs for Innovativ e Curriculums (EPIC) four-step scheme of objective evaluation is based on a three-dimensional structure of variables influencing instructional programs: (1) The Instructional Dimension (organization, content, method, facilities, cost); (2) The Institutional Dimension (student, teacher, administrator, educational specialist, family, community); (3) The Behavioral Dimension (psychomotor domain, affective domain, cognitive domain). Step 1 (Planned Program) involves identification of the variables felt to be affecting the instructional program under consideration, the combining of variables into factors (one variable from each dimension), the writing of behavioral objectives, and the development of the evaluative design. Step 2 is program description and data gathering; Step 3, data analysis; and Step 4, the decisionmaking recycling process. (The EPIC scheme is illustrated through description of its application to a specific program which has undergone evaluation.) (JS)

ED028103

A STRUCTURE AND SCHEME
FOR THE EVALUATION OF INNOVATIVE PROGRAMS

The EPIC BRIEF

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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EVALUATIVE PROGRAMS for INNOVATIVE CURRICULUMS

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EPIC EVALUATION CENTER
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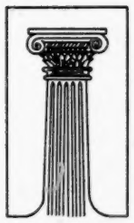
Established July 1, 1967, the EPIC Evaluation Center is supported by the U.S. Office of Education under the Elementary and Secondary Education Act of 1965, P.L. 89-10, Title III. Although it is federally funded, the Center basically functions as a regional evaluation center with its control, leadership, and services guided by the educational needs of the region it serves.



PREFACE

Research has failed to produce adequate guidelines and procedures to be utilized by school districts for the purpose of evaluating both current and innovative programs. The problem is complicated further by the fact that in the past, school districts have not included the process of evaluation as one of the major criteria for curriculum improvement. A lack of guidelines and the reluctance on the part of educators to include evaluation as a major function of curriculum development have produced a situation in which little evidence is available as to what should be evaluated, and how evaluation should take place. The guidelines offered in the literature are usually in the form of recommendations for administering achievement and intelligence tests. With these over-simplified approaches to the problem of evaluation, teachers and administrators are left with the problem of drawing conclusions from inadequate data and the general enthusiasm of teachers and pupils.

Recognizing the need for guidelines and the development of evaluation programs, the EPIC Evaluation Center has been involved in the formulation and implementation of a systematic scheme for evaluation. In this publication is presented a structure which permits the identification of the forces affecting a given program and a working scheme for evaluation.

INTRODUCTION TO EVALUATION

Evaluation is simply a procedure of collecting pertinent information which can then be used to facilitate decision-making.

However, evaluation can take on many different forms. One such form is subjective evaluation. This kind of evaluation is very popular and involves many value judgments on the part of those people doing the evaluating. Without the help of any procedural guidelines or criteria, something is labeled successful or unsuccessful because the evaluators have a good or bad feeling about it. As one can readily gather, the validity of any decision based on the information collected through subjective evaluation is quite low.

Another kind of evaluation is called external evaluation. In this form of evaluation, an outside agency does the evaluating and collects information to be used in decision-making.

One difference between this kind of evaluation and subjective evaluation is that the outside agency will usually have procedural guidelines and criteria that they will use in collecting information. The problem with this type of evaluation is that the people responsible for the decision-making and for whom the agency is working usually do not have any control over the procedural guidelines and criteria used by the outside agency, and in many cases the kinds of information collected. The result is that there is a lack of involvement on the part of those people who are going to use the information collected.

Another kind of evaluation is objective evaluation. In this form of evaluation, information collected in evaluation is used to provide feedback as to whether or not a given set of objectives has been met.

There are two essential differences between objective and the two kinds of evaluation previously mentioned. The first is that of objectives. If a person is to make a valid decision based on the information collected in evaluation, he must know what he is evaluating. This is accomplished only when he is able to state his objectives in behavioral terms. These objectives determine the procedures and criteria to be used in evaluation. The second difference is really an outgrowth of the first. Objective evaluation guarantees that the people responsible for decision-making will become involved in the evaluation because they are the ones who have to write the behavioral objectives to be evaluated.

Of the three kinds of evaluation previously described, objective evaluation seems to be the most valid because of the information collected for decision-making. It also appears to be the most acceptable to school administrators because objective evaluation provides opportunities for involvement on the part of the school staff.

There are many frustrations and problems connected with evaluation. The purpose of this paper is to eliminate some of these frustrations and problems by providing an outline of a systematic approach for sound and continuous evaluation for people who, for the most part, have not been trained in the techniques and procedures used in evaluation.

THE EPIC STRUCTURE OF VARIABLES INFLUENCING INSTRUCTIONAL PROGRAMS

Any instructional program is affected by many variables, not only within the educational setting, but also outside of it. These variables may combine in many different ways to produce different kinds of outcomes in the instructional program.

It would therefore be helpful to the evaluator if these variables could be displayed in such a way that he could visually see the different ways the variables could come together to affect the outcomes of an instructional program.

Figure 1 shows an organizational structure of those variables which might affect an instructional program. The variables are displayed along three dimensions.

INSTRUCTIONAL DIMENSION

The Instructional Dimension is that dimension which describes the program in terms of specific variables. The first of these variables is Organization. Organization is the matrix in which teachers and pupils are brought together in order that instruction can take place. The organizational matrix may be divided into two components--time and space:

1. Time refers to the duration and sequence of blocks of time devoted to the subjects taught. Duration may be defined as the length of any given period. Sequence may be defined as the order in which subjects are taught. Duration and sequence may be thought of in terms of both daily and weekly scheduling. (Example: Science may be taught only twice a week.)

2. Space refers to the vertical and horizontal organization of students. Vertical organization serves to classify students and move them upward from the point of admission to the point of departure. Horizontal organization divides students among teachers.

The second variable is Content. Content is that body of knowledge which is identified with the subject matter of a discipline. Content may be described in terms of specific topics to be covered at a given grade level.

A third variable is Methodology. Methodology is the process which facilitates learning. It has three levels: teaching activities, types of interaction, and learning principles or theories utilized.

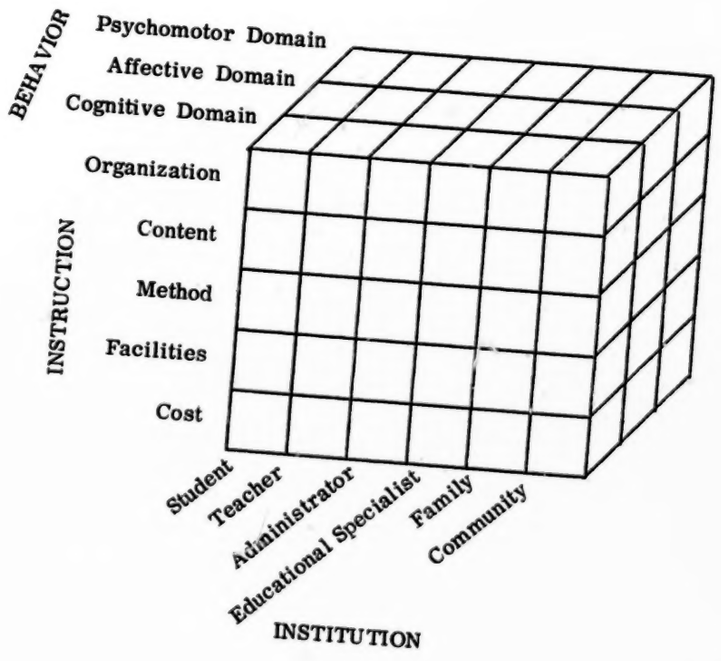
The fourth and fifth variables are Facilities and Cost. Facilities include space, special equipment, and expendables needed to support an educational program. Cost is the money required for facilities, maintenance, and personnel to accomplish a given task.

INSTITUTIONAL DIMENSION

The Institutional Dimension includes the variables of Child, Teacher, Administrator, Educational Specialist, Family, and Community. Any given program will be influenced by the unique qualities of the individuals involved. Evaluation programs of the past have focused primarily on the child and his response to content in a given subject area. With the changes taking place in instructional programs, more evidence is needed as to the influence of the teacher, administrator, parent, and community on a given program.

FIGURE 1

EPIC STRUCTURE OF VARIABLES
INFLUENCING INSTRUCTIONAL PROGRAMS



BEHAVIORAL DIMENSION

Evaluation as a process is best approached through objectives stated in behavioral terms. At this point in the development of the structure, three variables for classifying objectives are recognized.

The first of these variables is Cognitive Behavior. Cognitive Behavior includes the recall, comprehension, and application of knowledge and the utilization of intellectual skills of analysis, synthesis, and evaluation. The best example of tests in this area are the standardized tests of achievement. In the majority of programs this is the only test utilized to measure the success or failure of an elementary school program.

The second variable in the Behavioral Dimension is Affective Behavior. Affective Behavior is defined as the interest, attitudes, values, appreciations, and adjustments of the individual. In recent years we have reached a point in the evaluation process where we are concerned not only with the knowledge gained, but with the willingness of the student to identify himself with a given subject. Many instructional programs today repel students for reasons other than academic ability. Recognizing this fact, it is important that we look at the attitudinal reasons for this behavior. Not only are standardized attitudinal tests utilized in the measurement of affective behavior, but use is made of teacher-constructed instruments such as sociograms, checklists, and rating scales.

Psychomotor Behavior is the third variable in the Behavioral Dimension of the EPIC Structure. It includes those acts which involve neuro-muscular coordination. Handwriting and physical education utilize this variable to draw conclusions about special programs.

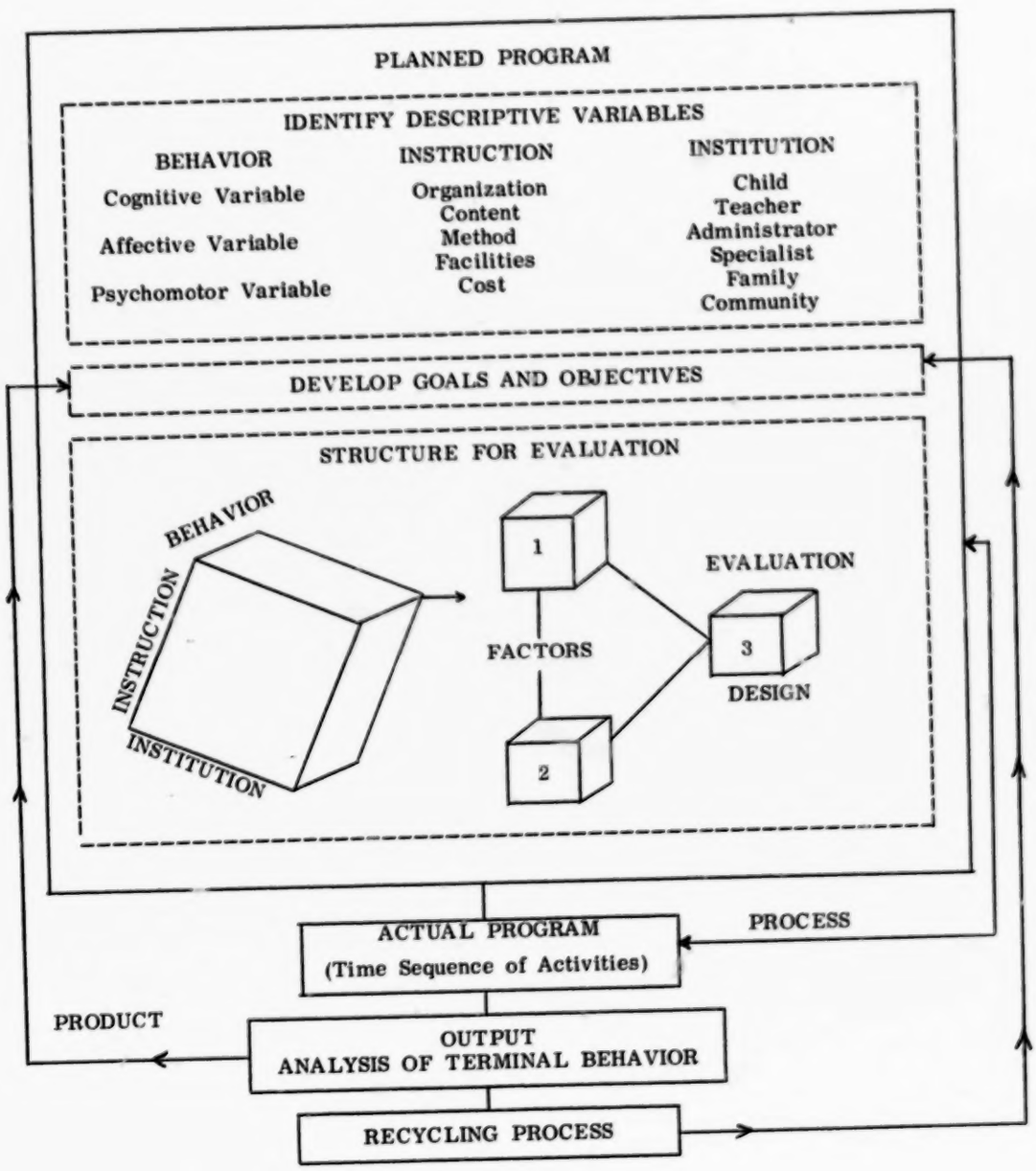
SUMMARY

The EPIC Structure of Variables Influencing Instructional Programs provides a framework to identify the forces affecting a given program. The factors created by the interaction of one variable from each of the dimensions may be studied in depth by any school district.

The EPIC Structure of Variables Influencing Instructional Programs is incorporated into the EPIC Scheme for Evaluation which represents a procedure for the systematic evaluation of educational programs, both current and innovative. Although this scheme, as shown in Figure 2, describes the carefully defined steps used by the EPIC Evaluation Center, it is applicable to the evaluation of any program.

FIGURE 2

EPIC SCHEME FOR EVALUATION OF INNOVATIONS



DISCUSSION OF EPIC SCHEME FOR EVALUATION

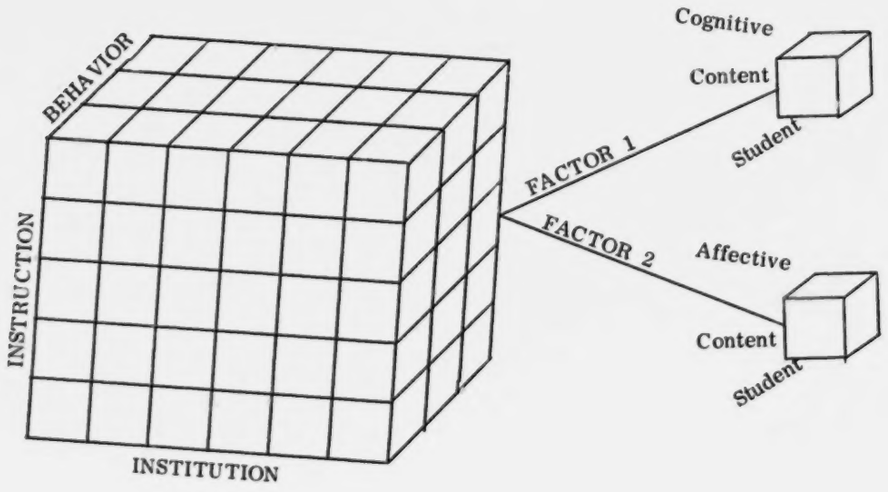
This section will discuss the EPIC Scheme for Evaluation by applying it to a specific program which has undergone evaluation.

The program was an individualized reading instruction approach which was applied to elementary students who (1) did not know what they had read after reading silently or orally, (2) did not have the skills for working out the pronunciation of a new word, (3) could not concentrate on reading, (4) had a passive or active resistence to reading, (5) could not distinguish letters from words, and (6) became confused when following a sequence of ideas.

The individualized reading approach which was used involved the use of: (1) a card laboratory, (2) programmed readers, (3) audiovisual units, (4) a controlled reader approach, (5) individualized teacher-student discussions, (6) interaction approach to the use of basic readers, and (7) phonetic and structural analysis of materials.

EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
Step One--Planned Program	Step One--Planned Program
(See Figure 2) A. Identify those variables that are felt to be affecting the instructional program under consideration. These variables will depend upon the portion of the instructional program selected for study.	A. Identification of Descriptive Variables 1. Institutional Dimension Student--Sixty-two students in grades 2 through 8. They came from families of landowners, farm workers, and supportive service people. They represented the ethnic groups of Negro, Mexican-American, Anglo, Indian, and Oriental. 2. Instructional Dimension Content--The content of the program included the following materials: a. SRA Reading for Understanding b. Sullivan Programmed Reading Materials c. Merrill Hill Tapes d. Basic Readers--Golden Rule Series e. Low vocabulary/high interest books 3. Behavioral Dimension Cognitive Behavior a. Knowledge involves the recall of specifics, processes, methods, or the recall of a pattern, setting, or structure.

EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
	Step One--Planned Program (Cont.)
	b. Comprehension involves that level of understanding which allows the individual to know what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications.
	Affective Behavior
	a. Valuing: The learner displays behavior consistent with a belief or attitude in situations where he is not forced to comply or obey.
B. After the variables have been identified, they can be combined into factors. A factor is a combination of one variable from each of the three dimensions.	B. Factors
	1. Student--Content--Cognitive Behavior
	2. Student--Content--Affective Behavior



EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
Step One--Planned Program (Cont.)	Step One--Planned Program (Cont.)
C. Once the factors have formed, the behavioral objectives are written. Essentially, four questions must be answered by a behavioral objective: 1. What is the institutional variable? 2. What is the instructional variable? 3. What is the behavioral variable? 4. How is the behavior going to be measured? The task of writing objectives becomes a very easy one, since three of the four questions have been answered as a result of the factors produced through identification of the variables influencing the program.	C. Objectives When exposed to the individualized reading instruction program the student will: Objective #1--increase his word recognition skills as measured by the Silvaroli Reading Inventory. 1. Institutional Variable--Student 2. Instructional Variable--Content 3. Behavioral Variable--Cognitive (Knowledge) 4. Measurement--Silvaroli Reading Inventory Objective #2--improve his reading comprehension skills as measured by the Silvaroli Reading Inventory. 1. Institutional Variable--Student 2. Instructional Variable--Content 3. Behavioral Variable--Cognitive (Comprehension) 4. Measurement--Silvaroli Reading Inventory Objective #3--display improved attitudes toward reading as measured by the Ebert Reading Attitude Inventory. 1. Institutional Variable--Student 2. Instructional Variable--Content 3. Behavioral Variable--Affective (Valuing) 4. Measurement--Revised Ebert Reading Attitude Inventory
D. Once the program objectives have been stated, an evaluation design can be developed. This design is basically a description of how the data is to be collected and analyzed in order to determine if the objectives have been met. Things such as sample size, treatment descriptions, statistical analysis, and limitations should be included in the evaluation design.	D. Evaluation Design 1. Procedure a. The sixty students in the remedial reading program were considered the sample. b. At the beginning of the school year, the Silvaroli Reading Inventory and the Revised Ebert Reading Attitude Inventory were administered to the students. c. The individualized reading instruction program was carried out from September to May.

EPIC EVALUATION SCHEME

IMPLEMENTATION OF EPIC EVALUATION SCHEME

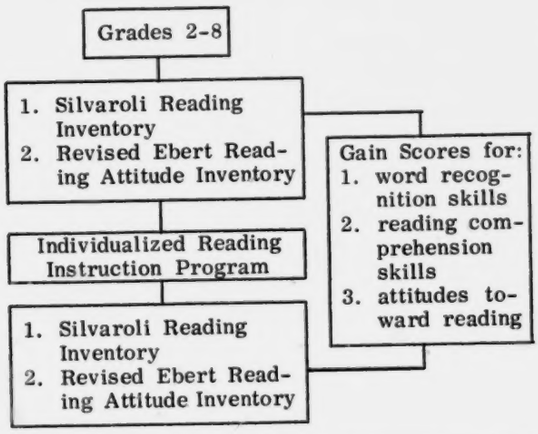
Step One--Planned Program (Cont.)

d. At the end of the school year the Silvaroli Reading Inventory and the Revised Ebert Reading Attitude Inventory were again administered.

e. Gain scores were computed for word recognition skills, reading comprehension skills, and student attitudes toward reading.

f. Matched t-tests were then carried out on the above gains to determine if any significant changes occurred.

2. Schematic Representation of the Evaluation Design


Grades 2-8
1. Silvaroli Reading Inventory
2. Revised Ebert Reading Attitude Inventory
Individualized Reading Instruction Program
1. Silvaroli Reading Inventory
2. Revised Ebert Reading Attitude Inventory
Gain Scores for:
1. word recognition skills
2. reading comprehension skills
3. attitudes toward reading

Step Two--Actual Program Description (See Figure 2)

During the period of evaluation, an on-going description of what is actually happening in the program is needed. This description may be in the form of periodic reports of activities in the on-going program. The activities reported would of course change, depending on the nature of the program.

The actual program description is necessary because it will provide information as to whether or not the

Step Two--Actual Program Description

1. Each student had at least one contract with the teacher each week.

2. Each teacher worked with one-half the students either individually or in small homogeneous groups.

3. Each teacher worked with about thirty students per week in groups of from one to five per period.

4. The pre-testing of the Revised Ebert Reading Attitude Inventory did not take place until February.

EPIC EVALUATION SCHEME

Step Two--Actual Program Description (Continued)

program is being carried out as planned. Then, if changes do occur, the necessary revisions in the evaluation design can be made. Further, the information gained from the actual program description may provide insights which can then be incorporated into the on-going program immediately rather than waiting until the program is culminated and then discovering something that should have been incorporated in the program. Finally, and probably most important of all, through an actual program description, the evaluator is provided with much more information which in turn leads to more valid decision-making.

IMPLEMENTATION OF EPIC EVALUATION SCHEME

Step Two--Actual Program Description (Continued)

5. The number of students in one of the classes for whom complete sets of test scores were available was very small, due to absentees and drop-outs.

6. The following materials were used in the individualized instruction program:

SRA Labs for:
- a. information gathering
- b. association to discover cause and effect
- c. discovering likenesses and differences
- d. word meaning and word analysis

RFU (SRA's Reading for Understanding) for:
- a. getting meaning from words
- b. thinking critically

Sullivan Programmed Reading for:
- a. vocabulary building
- b. reading by spelling

Phonovisual Program for:
- a. phonics

Controlled Reader for:
- a. vocabulary
- b. comprehension
- c. sequence

Filmstrips for:
- a. phonics

Tachistoscope for:
- a. practice for instant recognition

Word games for:
- a. reinforcement by repetition of vocabulary and phonic elements

Merrill Skilltapes for:
- a. getting information
- b. understanding ideas
- c. organizing ideas
- d. making judgments
- e. studying words to:

EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
	Step Two--Actual Program Description (Continued) (1) determine word meanings from context, and (2) identify synonyms, homonyms, antonyms f. reading directions
Step Three--Output/Analysis of Terminal Behavior (See Figure 2) Following the completion of the program, the data is analyzed. The results are then related directly back to the program objectives to determine the extent to which the given program is reaching the desired outcomes.	Step Three--Output/Analysis of Terminal Behavior Using the pre- and post-word recognition scores from the Silvaroli Reading Inventory and a matched t-test, a value of 15.33 resulted (significant at the .01 level). This indicates that a significant increase in word recognition skills did take place during the school year. In order to determine if any significant gains in reading comprehension had occurred during the school year, a matched t-test was applied to the pre- and post-reading comprehension scores from the Silvaroli Reading Inventory. A significant t of 11.03 resulted (significant at the .01 level) which indicates that a significant increase in reading comprehension skills did occur. Also, an attempt was made to determine if the gap between the students' grade and reading level changed during the school year. Pre- and post-difference scores (grade level minus reading level) were used in a matched pair t-test. A t=8.17 resulted, which was significant at the .01 level. These results indicate that the students' reading level increased at a higher rate than their grade level. Consequently, a decrease in the gap between the students' grade and reading level occurred through the school year. The Revised Ebert Reading Attitude Inventory was used to assess the students' attitudes toward reading. The pre-test was administered in February

EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
	Step Three--Output/Analysis of Terminal Behavior (Continued) rather than in September, while the post-test was administered at the end of the school year in May. When a matched t-test was applied to the pre- and post-attitude scores, a value of t=.48 resulted, which indicates that no significant gains in attitude occurred. The possible range of scores on the Revised Ebert Reading Attitude Inventory is 200-40. The higher a student's score, the more positive is his attitude toward reading. The pre-attitude mean for this group of students was 154.88, which tends to be toward the positive end of the scale. Therefore, it might be possible that a positive change in attitude did take place between September and February, and at the time of pre-testing, the attitude change was complete, so consequently no additional change took place through May.
Step Four--Recycling Process (See Figure 2) In the recycling process step, the evaluator and the people involved in the program come together for the specific purpose of making vital decisions necessary for program development. Program development entails the consideration of (1) those objectives not met through the actual program activities, and (2) new or additional objectives that might further improve the given program.	Step Four--Recycling Process This study was limited to three objectives concerned with improving the students' (1) word recognition skills, (2) reading comprehension skills, and (3) attitudes toward reading. For a more thorough evaluation, the following additional objectives might be examined: Objective #1--To improve the student's ability to apply reading skills to other school experiences. The application of reading skills to other school experiences may be defined as (1) the ability to read subject matter in math, social studies, science, etc. sufficiently well to enable him to work problems, experiments, or any other task associated with the given subject matter content,

EPIC EVALUATION SCHEME	IMPLEMENTATION OF EPIC EVALUATION SCHEME
	Step Four--Recycling Process (Continued)
	(2) the ability to read subject matter material sufficiently well that he does not depend on oral reading by others to enable him to do assignments, and (3) improvement in spelling in formal and incidental writing. A measure of a student's ability to apply reading skills to other school situations might be indicated by (1) teacher observations, (2) standardized tests, (3) teacher-made tests, (4) parent conferences, and (5) student interviews.
	Objective #2--To have the teachers more closely approximate their ideal type of teaching of reading. The ideal type of teaching of reading may be defined in terms of the three dimensions of familiarity with professional literature, application of knowledge gained from readings, and teacher-student interaction patterns. A measure of a teacher's approximate of the ideal might be indicated by (1) the extent to which he or she reads professional literature, (2) the extent to which the teacher uses ideas gained from professional reading in the classroom, and (3) the extent to which the teacher praises, encourages, accepts student feelings, and uses student ideas while teaching reading.
After the decisions are made with respect to the variables and objectives to be considered in the instructional program, the recycling process re-initiates the program back to the "planned program" phase in order that the process of evaluation may be continued.	

SUMMARY

Probably the most common mistake that one makes in evaluation is to "bite off more than he can chew." By this is meant that the evaluator attempts

to evaluate such a large portion of a given educational program that he loses control of the evaluation procedures. Thus, since there is a lack of control of the variables affecting the educational program in question, the data is not collected under ideal conditions. Consequently, conclusions or decisions are made which in many cases are not valid.

If evaluation is to be carried out effectively, one must focus on a specific aspect of the total educational program. This focusing may take place by first of all selecting a given subject and grade. Once this has been done, the evaluator whould select the institutional, instructional, and behavioral variables which seem to be most important, at least in the first cycle of evaluation. If the focusing is done properly, a small number of objectives will result and a stable evaluation design can be built.

Ideally, the total educational program will undergo evaluation, but this may take many cycles with new objectives being added in each cycle.

In summary, focusing allows the evaluation to control given variables while analyzing others in terms of their effects on a given educational program. This kind of evaluation procedure leads to decisions which are not only valid, but also allows educators to break down a given instructional program and look at the effects of its constituent parts.

A question that arises when discussing the importance of focusing is, "Who should decide on what to evaluate?" The best way to answer this question is to say that it should be a joint effort on the part of the administration and teaching staff. A need for evaluation may be indicated by one particular individual, but once the need has been expressed, it is important that those who will be responsible for the collection and analysis procedures and those people who will be responsible for the decision-making participate in the designing of the evaluation procedures. If this is done, representatives from both the administration and teaching staff will become involved in the evaluation.

The importance of a sound approach to the problem of evaluation cannot be over-emphasized. Evaluation at the local level has been the problem-child of education--everyone needing and wanting answers to the problem, but no one willing to take on the task of attacking the complex problems involved. This paper represents one approach toward a solution of this problem. The solution to this problem will most certainly develop from the willingness of educators at the local level becoming actively involved in the process of evaluation supported by the necessary professional and technical assistance available.

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